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 Terms used irregular mesh and hybrid mesh

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1 [Hybrid meshes: multiresolution using regular and irregular refinement](#)

Igor Guskov, Andrei Khodakovsky, Peter Schröder, Wim Sweldens

 June 2002 **Proceedings of the eighteenth annual symposium on Computational geometry**

Full text available: pdf(21.21 MB)

 Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

A hybrid mesh is a multiresolution surface representation that combines advantages from regular and irregular meshes. Irregular operations allow a hybrid mesh to change topology throughout the hierarchy and approximate detailed features at multiple scales. A preponderance of regular refinements allows for efficient data-structures and processing algorithms. We provide a user driven procedure for creating a hybrid mesh from scanned geometry and present a progressive hybrid mesh compression algorithm ...

Keywords: compression algorithms, curves & surfaces, geometric modeling, level of detail algorithms, polygonal modeling, remeshing

2 [Globally smooth parameterizations with low distortion](#)

Andrei Khodakovsky, Nathan Litke, Peter Schröder

 July 2003 **ACM Transactions on Graphics (TOG)**, Volume 22 Issue 3

Full text available: pdf(7.26 MB)

 Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Good parameterizations are of central importance in many digital geometry processing tasks. Typically the behavior of such processing algorithms is related to the smoothness of the parameterization and how much distortion it contains. Since a parameterization maps a bounded region of the plane to the surface, a parameterization for a surface which is not homeomorphic to a disc must be made up of multiple pieces. We present a novel parameterization algorithm for arbitrary topology surface meshes ...

Keywords: compression, parameterization, rate distortion, resampling, smoothness

3 [Cut-and-paste editing of multiresolution surfaces](#)

Henning Biermann, Ioana Martin, Fausto Bernardini, Denis Zorin

 July 2002 **ACM Transactions on Graphics (TOG)**, **Proceedings of the 29th annual conference on Computer graphics and interactive techniques**, Volume 21 Issue 3

Full text available: pdf(10.24 MB)

 Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Cutting and pasting to combine different elements into a common structure are widely used operations that have been successfully adapted to many media types. Surface design could also benefit from the availability of a general, robust, and efficient cut-and-paste tool, especially during the initial stages of design when a large space of alternatives needs to be explored. Techniques to support cut-and-paste operations for surfaces have been proposed in the past, but have been of limited usefulness ...

- 4 Large scale parallel structured AMR calculations using the SAMRAI framework
 Andrew M. Wissink, Richard D. Hornung, Scott R. Kohn, Steve S. Smith, Noah Elliott
 November 2001 **Proceedings of the 2001 ACM/IEEE conference on Supercomputing (CDROM)**

Full text available:  [pdf\(520.65 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This paper discusses the design and performance of the parallel data communication infrastructure in SAMRAI, a software framework for structured adaptive mesh refinement (SAMR) multi-physics applications. We describe requirements of such applications and how SAMRAI abstractions manage complex data communication operations found in them. Parallel performance is characterized for two adaptive problems solving hyperbolic conservation laws on up to 512 processors of the IBM ASCI Blue Pacific system. ...

- 5 On-the-Fly rendering of losslessly compressed irregular volume data
 Chuan-Kai Yang, Tulika Mitra, Tzi-Cker Chiueh
 October 2000 **Proceedings of the conference on Visualization '00**

Full text available:  [pdf\(239.89 KB\)](#) Additional Information: [full citation](#), [citations](#), [index terms](#)

Keywords: Tetrahedral Compression, irregular grids, volume rendering

- 6 Dual-level parallelism for deterministic and stochastic CFD problems
 Suchuan Dong, George Em. Karniadakis
 November 2002 **Proceedings of the 2002 ACM/IEEE conference on Supercomputing**

Full text available:  [pdf\(580.53 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)


A hybrid two-level parallelism using MPI/OpenMP is implemented in the general-purpose spectral/*hp* element CFD code **NekTar** to take advantage of the hierarchical structures arising in deterministic and stochastic CFD problems. We take a coarse grain approach to shared-memory parallelism with OpenMP and employ a workload-splitting scheme that can reduce the OpenMP synchronizations to the minimum. The hybrid implementation shows good scalability with respect to both the problem ...

- 7 A hybrid execution model for fine-grained languages on distributed memory multicomputers
 John Plevyak, Vijay Karamcheti, Xingbin Zhang, Andrew A. Chien
 December 1995 **Proceedings of the 1995 ACM/IEEE conference on Supercomputing (CDROM)**

Full text available:  [html\(59.68 KB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

- 8 Optimal isosurface extraction from irregular volume data
 P. Cignoni, C. Montani, E. Puppo, R. Scopigno
 October 1996 **Proceedings of the 1996 symposium on Volume visualization**


Full text available: Additional Information:

 pdf(890.78 KB)[full citation](#), [references](#), [citations](#), [index terms](#)

9 Session P1: point-based rendering and modeling: POP: a hybrid point and polygon rendering system for large data



Baoquan Chen, Minh Xuan Nguyen

October 2001 **Proceedings of the conference on Visualization '01**Full text available:  pdf(6.40 MB)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)


We introduce a simple but effective extension to the existing pure point rendering systems. Rather than using only points, we use both points and polygons to represent and render large mesh models. We start from triangles as leaf nodes and build up a hierarchical tree structure with intermediate nodes as points. During the rendering, the system determines whether to use a point (of a certain intermediate level node) or a triangle (of a leaf node) for display depending on the screen contribution ...

Keywords: hybrid rendering systems, level of detail algorithms, rendering system, spatial data structures

10 A survey of methods for recovering quadrics in triangle meshes



Sylvain Petitjean

June 2002 **ACM Computing Surveys (CSUR)**, Volume 34 Issue 2Full text available:  pdf(3.91 MB)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

In a variety of practical situations such as reverse engineering of boundary representation from depth maps of scanned objects, range data analysis, model-based recognition and algebraic surface design, there is a need to recover the shape of visible surfaces of a dense 3D point set. In particular, it is desirable to identify and fit simple surfaces of known type wherever these are in reasonable agreement with the data. We are interested in the class of quadric surfaces, that is, algebraic surfaces ...

Keywords: Data fitting, geometry enhancement, local geometry estimation, mesh fairing, shape recovery

11 Data and program restructuring of irregular applications for cache-coherent multiprocessor



Karen A. Tomko, Santosh G. Abraham

July 1994 **Proceedings of the 8th international conference on Supercomputing**Full text available:  pdf(1.33 MB)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Applications with irregular data structures such as sparse matrices or finite element meshes account for a large fraction of engineering and scientific applications. Domain decomposition techniques are commonly used to partition these applications to reduce interprocessor communication on message passing parallel systems. Our work investigates the use of domain decomposition techniques on cache-coherent parallel systems. Many good domain decomposition algorithms are now available ...

12 Session P11: subdivision: Normal bounds for subdivision-surface interference detection



Eitan Grinspun, Peter Schröder

October 2001 **Proceedings of the conference on Visualization '01**

Full text available:  pdf(7.55 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Subdivision surfaces are an attractive representation when modeling arbitrary topology free-form surfaces and show great promise for applications in engineering design [5, 6] and computer animation [10]. Interference detection is a critical tool in many of these applications. In this paper we derive normal bounds for subdivision surfaces and use these to develop an efficient algorithm for (self-) interference detection.

Keywords: gauss map, loop's scheme, multiresolution surfaces, self-interference, subdivision surfaces

13 Real-time, continuous level of detail rendering of height fields

Peter Lindstrom, David Koller, William Ribarsky, Larry F. Hodges, Nick Faust, Gregory A. Turner

August 1996 **Proceedings of the 23rd annual conference on Computer graphics and interactive techniques**

Full text available:  pdf(1.09 MB)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)



14 A comparison of scalable superscalar processors

Bradley C. Kuszmaul, Dana S. Henry, Gabriel H. Loh

June 1999 **Proceedings of the eleventh annual ACM symposium on Parallel algorithms and architectures**

Full text available:  pdf(1.53 MB)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)



15 Bubble mesh: automated triangular meshing of non-manifold geometry by sphere packing

Kenji Shimada, David C. Gossard

December 1995 **Proceedings of the third ACM symposium on Solid modeling and applications**

Full text available:  pdf(1.03 MB)

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16 Grow & fold: compression of tetrahedral meshes

Andrzej Szymczak, Jarek Rossignac

June 1999 **Proceedings of the fifth ACM symposium on Solid modeling and applications**

Full text available:  pdf(1.35 MB)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)



17 Efficient support for irregular applications on distributed-memory machines

Shubhendu S. Mukherjee, Shamik D. Sharma, Mark D. Hill, James R. Larus, Anne Rogers, Joel Saltz

August 1995 **ACM SIGPLAN Notices , Proceedings of the fifth ACM SIGPLAN symposium on Principles and practice of parallel programming**, Volume 30 Issue 8

Full text available:  pdf(1.36 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)



Irregular computation problems underlie many important scientific applications. Although these problems are computationally expensive, and so would seem appropriate for parallel machines, their irregular and unpredictable run-time behavior makes this type of parallel

program difficult to write and adversely affects run-time performance. This paper explores three issues—partitioning, mutual exclusion, and data transfer—crucial to the efficient execution of Irregular pro ...

18 Performance modeling and tuning of an unstructured mesh CFD application

William D. Gropp, Dinesh K. Kaushik, David E. Keyes, Barry Smith

November 2000 **Proceedings of the 2000 ACM/IEEE conference on Supercomputing (CDROM)**

Full text available:  [pdf\(109.40 KB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)


 [Publisher Site](#)

This paper describes performance tuning experiences with a three-dimensional unstructured grid Euler flow code from NASA, which we have reimplemented in the PETSc framework and ported to several large-scale machines, including the ASCI Red and Blue Pacific machines, the SGI Origin, the Cray T3E and Beowulf clusters. The code achieves a respectable level of performance for sparse problems, typical of scientific and engineering codes based on partial differential equations, and scales well u ...

19 Bounded aspect ration triangulation of smooth solids

Doug Moore, Joe Warren

May 1991 **Proceedings of the first ACM symposium on Solid modeling foundations and CAD/CAM applications**


Full text available:  [pdf\(1.03 MB\)](#)

Additional Information: [full citation](#), [references](#), [index terms](#)

20 Parallelization of a dynamic unstructured application using three leading paradigms

Leonid Oliker, Rupak Biswas

January 1999 **Proceedings of the 1999 ACM/IEEE conference on Supercomputing (CDROM)**

Full text available:  [pdf\(1.04 MB\)](#)

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